



Engineering Sciences Section – 2007

C31 Using Human Factors Engineering to Evaluate Existing Walkway Accessibility Standards

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After attending this presentation, attendees will gain an understanding of the process involved in conducting original research as part of a forensic human factors investigation as well as insight into how to evaluate the psychological or human factors that often interact with engineering issues. This presentation will impact the forensic community by demonstrating an approach to evaluating accessibility requirements.

This presentation will impact the forensic community and/or humanity by demonstrating The authors use this case study to illustrate the practical application of employing human factors research in evaluating existing standards and to provide a basis discuss accessibility in the legal arena.

The authors discuss the atypical lack of a theoretical research foundation for ADA/FHA/building code requirements for slopes and cross-slopes of walkways and ramps. The authors demonstrate the use of original research to evaluate perceptions of wheelchair users.

The FHA requires that walkways be “accessible.” The Justice Department and various disability groups have contended that walkways are “inaccessible” if they do not meet the 2% cross-slope and 5% running slope standards and have sued developers to have non-conforming sidewalks replaced.

This study was conducted to evaluate the threshold point at which slopes, cross-slopes, and their interaction are detectable to wheelchair users. It also evaluated the degree to which wheelchair users could perceive a difference in slope and cross-slope by assessing their ability to detect the relative difference between two paired walkways/ramps (one conforming, one non-conforming; See Figure 1). Participants’ perceived workload exerted in negotiating these surfaces was also evaluated.

The results indicate that the existing requirements are not supported by empirical research and are in fact inconsistent with results found by experimentation. Principal findings include:

1. Wheelchair users cannot reliably detect differences in cross-slope between a ramp at the existing standard of 2% and 2nd ramp set to up to 5%.
2. Wheelchair users cannot reliably perceive a difference in running slope between a ramp at the existing standard of 5% and a second set up to 7%.
3. When participants could detect a cross-slope difference at 6%, they still did not rate this as requiring anything more than “light” or “very light” effort to travel the length of the ramp, and almost two-thirds of the manual wheelchair users said that they would not have a problem traveling a ramp with a 6% cross slope that was almost four times longer than the test ramp.

This study provides an empirical basis for a discussion of what is accessible for wheelchair users. The findings indicate that a deviation in cross-slope from the 2% standard or in running slope from the 5% standard for a distance of up to 4 flags (4-foot sidewalk squares; the 20-foot distance of this study) would not make sidewalks inaccessible. For example, if a sidewalk had a 2% running slope and the cross-slope changed from 2% to 5% for a distance of 3 flags, it would not be inaccessible, and in fact, many wheelchair users may not be able to detect the difference. Similarly, if the cross-slope was 2%, and the running slope changed from 5% to 7%, it would not be inaccessible.

Human Factors, Environmental Design, Accessibility